AF

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF APPEALS

In re Patent Application of: NORDSTROM ET AL.	)	
Serial No. 09/555,816	)	Examiner: B. HOFFMAN
Confirmation No: 9460	)	Art Unit: 2136
Filing Date: OCTOBER 10, 2000	)	
For: DATA SCRAMBLERS	)	

APPELLANT'S SUPPLEMENTAL APPEAL BRIEF

Mail Stop Appeal Brief-Patents
Commissioner for Patents
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Alexandria, VA 22313-1450

Sir:

Submitted herewith is Appellant's Supplemental Appeal Brief. If any additional extension and/or fee is required, authorization is given to charge Deposit Account No. 01-0484.

(1)-(4) *See Appellant's Brief.*

(5) SUMMARY OF CLAIMED SUBJECT MATTER

As described on page 5, line 9 through page 7, line 1 of the specification with reference to FIG. 1 (reproduced below), the disclosed invention is directed to multi-carrier transmission systems, including copper based transmission systems such as ADSL, VDSL and HDSL which use DMT and/or radio based transmission systems using OFDM. More specifically, the invention is directed to data scramblers, descramblers, systems and methods making use of the synchronization frames, normally used for measuring channel characteristics, as a source of pseudo-random data that is combined with user data.

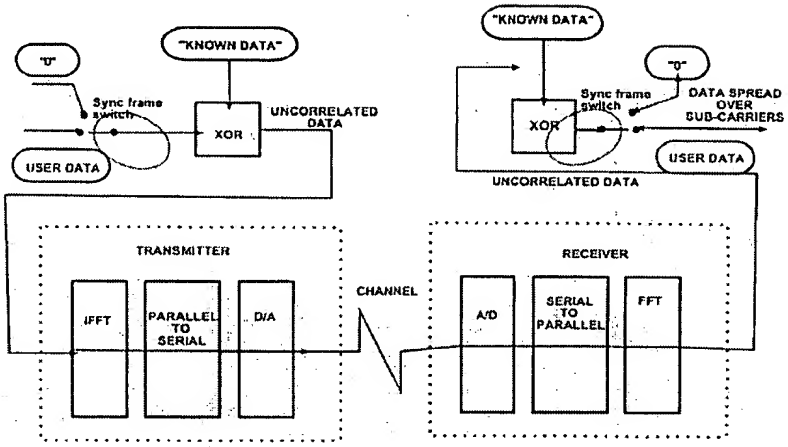

FIGURE 1

Most telecommunications transmission systems are designed to give optimum performance when uncorrelated data is transmitted over the system. Unfortunately, user data is not usually uncorrelated and may, for example, include relatively long strings of binary "0"s, or "1"s. If such data is transmitted over a transmission system intended for uncorrelated data, it can result in saturation, i.e. too large a dynamic range, synchronization drift, etc. This problem has long been recognized by telecommunications engineers and the conventional approach is to scramble the incoming user data so that it behaves as though it was uncorrelated data. Known data scramblers use a process to combine user data with a random data string, thereby producing an uncorrelated data stream for transmission.

The present invention simplifies known data scramblers by making use of the synchronization frames, normally used for measuring channel characteristics, as a source of pseudo-random data which can be combined with

incoming user data. The present invention includes multi-carrier transmission systems which use, for example, DMT, or OFDM. Many of these transmission systems send known data, usually referred to as synchronization frames, to measure channel characteristics such as signal to noise ratio. The known data contained in a synchronization frame is selected to have a suitable statistical distribution, e.g. pseudo-random. In the data scrambler of the present invention, user data bits are combined with the known synchronization frame data, typically the two most significant bits, using an exclusive-OR function. This results in a statistically and computationally efficient scrambling of the user data.

The present invention results in a much improved statistical distribution of modulated sub-carriers, in a multi-carrier transmission system, compared to the case where no scrambling is used for correlated, or null data situations.

The Claims on appeal include independent Claims 24, 28, 32, 37 and 41. Independent Claim 24 is directed to a data scrambler, for use in a multi-carrier transmission system in which synchronization frame data is periodically transmitted from a transmitter to a receiver to measure transmission channel characteristics, the data scrambler comprising a combiner unit to combine user data with frame synchronization data. Similarly, independent Claim 28 is directed to a data descrambler comprising a second combiner unit to combine received data with frame synchronization data.

Independent Claim 32 is directed to a multi-carrier transmission system comprising a receiver, a transmitter to periodically transmit synchronization frame data to the receiver to measure transmission channel characteristics, and

a data scrambler connected to the transmitter and comprising a combiner unit to combine user data with frame synchronization data. Independent Claim 37 recites a method of scrambling user data prior to transmission in a multi-carrier transmission system in which synchronization frame data is periodically transmitted from a transmitter to a receiver to measure transmission channel characteristics. The method includes combining user data with frame synchronization data to define scrambled data, and transmitting the scrambled data to the receiver. Likewise, independent method Claim 41 recites receiving the scrambled data, and combining the scrambled data with frame synchronization data.

(6) GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

In response to the arguments presented in Appellant's Brief filed June 15, 2004, the Examiner has withdrawn the previous rejection. Claims 24-46 now stand rejected under 35 U.S.C. §103 over Kloker (U.S. Patent No. 4,539,684) in view of Isaksson et al. (WIPO 9503656).

(7) ARGUMENT

Claims 24-46 were rejected in view of Kloker (U.S. Patent No. 4,539,684) in view of Isaksson et al. (WIPO 9503656) for the reasons set forth in the Office Action mailed July 14, 2004. Appellants contend that Claims 24-46 clearly define over the cited references, and in view of the following remarks, reversal of the Examiner's decision including the rejection under 35 U.S.C. §103 is requested. Independent Claims 24, 28, 32, 37 and 41 stand together. Dependent Claims 27, 31, 40 and 44 are argued separately below.

Kloker is directed to a communication system including an encoder and decoder for the transmission of digital information over a transmission medium. The system has frame synchronization and error correction. The encoder processes a data stream and generates a transmission bit stream of N bits using convolutional encoding, auto-synchronization sequence combining, and bit interleaving. However, as correctly recognized by the Examiner, Kloker is not directed to a multi-carrier transmission system. The Examiner has cited Kloker for the use of an auto-synchronization sequence combined with input data to reduce the transmission bit stream and obtain frame synchronization at the receiver using a multiphase sequential decoder, as shown, for example, in FIG. 3 of Kloker (reproduced below).

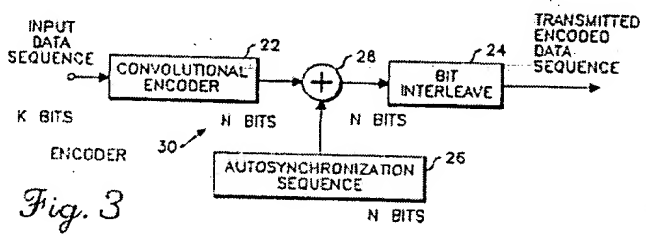

Fig. 3

However, there is nothing in Kloker that teaches or suggests that such a bit stream reducing process would be desirable in a data scrambler or descrambler of a multi-carrier transmission system using, for example, DMT, or OFDM. The Examiner has relied upon the reference to Isaakson et al. to allegedly make up for the deficiencies of Kloker.

The Isaksson et al. reference is a published Telia application and relates to a method and apparatus for synchronization of transmitters and receivers in OFDM type digital transmission systems. The system uses an FFT

technique to carry out the modulation and demodulation procedures. The transmitter sends synchronization frames with known frequencies and phase positions and with known time intervals in certain time slots. The receiver carries out a series of time shifted FFT operations over the time position where the synchronization frame is calculated to be. However, there is no teaching of a scrambler, descrambler or the use of any synchronization frames, normally used for measuring channel characteristics, as a source of pseudo-random data which can be combined with incoming user data. Moreover, there is no discussion of any need, desire or problem whatsoever associated with an uncorrelated data stream for transmission.

As such, Appellants maintain that the Examiner is impermissibly using the teachings of Appellants' own patent application as a roadmap to modify the prior art. For example, as noted above, the method and apparatus of Isaakson et al. does not discuss or teach the use of a scrambler, descrambler or any synchronization frames as a source of pseudo-random data. Also, Kloker is concerned with reducing the length of the transmission bit stream and not with producing an uncorrelated data stream for transmission in a multi-carrier transmission system.

Additionally, with respect to Claims 27, 31, 40 and 44, Appellants point to pages 4-5 of the most recent Office Action as further evidence of the Examiner's hindsight reasoning in making the obviousness rejection. Indeed, such dependent claims set forth the feature of the two most significant bits of the frame synchronization data are combined with user data in the combiner unit of the data scrambler or descrambler. As discussed in the specification

(e.g. page 2, lines 4-7), it was the Appellants that discovered that this results in a statistically and computationally efficient scrambling of the user data. In the previous Final Office Action, the Examiner provided no rationale or teaching for rejecting such claims, but instead provided the impermissible speculation that "any combination of bits...would produce similar results." Now, in the current office action, the Examiner takes "Official Notice" of a combiner combining user data with the two most significant bits of a synchronization frame.

As discussed in MPEP §2144.03, any rejection based on assertions that a fact is well-known or is common knowledge in the art without documentary evidence to support the Examiner's conclusion should be judiciously applied. Furthermore, any facts so noticed should be of notorious character and serve only to "fill in the gaps" in an insubstantial manner which might exist in the evidentiary showing made by the Examiner to support a particular ground for rejection. It is never appropriate to rely solely on common knowledge in the art without evidentiary support in the record as the principal evidence upon which a rejection was based.

The Examiner explains, for some unknown reason, the difference between using the two most significant bits versus using the least significant bits, before erroneously alleging that "EXCLUSIVE-ORing the two most significant bits provides the most amount of uncorrelated data." However, as the Examiner and Board are aware, Official notice unsupported by documentary evidence should only be taken by the Examiner where the facts asserted to be well-known, or to be common

knowledge in the art are capable of instant and unquestionable demonstration as being well-known. It was the Appellants that discovered that two most significant bits of the frame synchronization data being combined with user data in the combiner unit of the data scrambler or descrambler results in a statistically and computationally efficient scrambling of the user data. The Examiner has not provided any evidentiary support of a combiner unit of a data scrambler or descrambler combining the two most significant bits of the frame synchronization data with user data.

As the Examiner and Board are aware, to establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the reference itself or in the knowledge generally available to one of ordinary skill in the art, to modify the reference. Second, there must be a reasonable expectation of success. Finally, the prior art reference must teach or suggest all the claim features. The initial burden is on the Examiner to provide some suggestion of the desirability of doing what the Appellants have done. To support the conclusion that the claimed invention is directed to obvious subject matter, either the reference must expressly or impliedly suggest the claimed invention or the Examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the reference. Both the suggestion to make the claimed combination and the reasonable expectation of success must be founded in the prior art and not in Appellants' disclosure.

There is simply no teaching or suggestion in the cited references to provide the combination of features as claimed. Accordingly, for at least the reasons given above, Appellants maintain that the cited references do not disclose or fairly suggest the invention as set forth in Claims 24-46. Furthermore, no proper modification of the teachings of these references could result in the invention as claimed. Thus, the rejections under 35 U.S.C. §103(a) should be withdrawn.

CONCLUSIONS

In view of the substantive arguments presented above, it is submitted that all of the claims, namely Claims 24-46, are patentable over the prior art. Accordingly, Appellants respectfully request that all of the rejections be reversed.

Respectfully submitted,

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APPENDIX INCLUDING THE CLAIMS ON APPEAL
FOR U.S. PATENT APPLICATION SERIAL NO. 09/555,816

24. (previously presented) A data scrambler, for use in a multi-carrier transmission system in which synchronization frame data is periodically transmitted from a transmitter to a receiver to measure transmission channel characteristics, the data scrambler comprising a combiner unit to combine user data with frame synchronization data.

25. (previously presented) A data scrambler as claimed in Claim 24, wherein the combiner unit comprises an exclusive OR (XOR) combiner unit.

26. (previously presented) A data scrambler as claimed in Claim 24, wherein the frame synchronization data is pseudo-random.

27. (previously presented) A data scrambler as claimed in Claim 24, wherein the combiner unit combines the user data with the two most significant bits of a synchronization frame of the frame synchronization data.

28. (previously presented) A data descrambler, for use in a multi-carrier transmission system in which synchronization frame data is periodically transmitted from a transmitter to a receiver to measure transmission channel characteristics, and transmitted data is scrambled using a data scrambler comprising a first combiner unit to combine

user data with frame synchronization data, the data descrambler comprising a second combiner unit to combine received data with frame synchronization data.

29. (previously presented) A data descrambler as claimed in Claim 28, wherein the second combiner unit comprises an exclusive OR (XOR) combiner unit.

30. (previously presented) A data descrambler as claimed in Claim 28, wherein the frame synchronization data is pseudo-random.

31. (previously presented) A data descrambler as claimed in Claim 28, wherein the second combiner unit combines the received data with the two most significant bits of a synchronization frame of the frame synchronization data.

32. (previously presented) A multi-carrier transmission system comprising:

a receiver;

a transmitter to periodically transmit synchronization frame data to the receiver to measure transmission channel characteristics; and

a data scrambler connected to the transmitter and comprising a combiner unit to combine user data with frame synchronization data.

33. (previously presented) A multi-carrier transmission system as claimed in Claim 32, further comprising a data descrambler connected to the receiver and comprising a

second combiner unit to combine received data with frame synchronization data.

34. (previously presented) A multi-carrier transmission system as claimed in Claim 32, wherein said multi-carrier transmission system is a discrete multi-tone (DMT) system.

35. (previously presented) A multi-carrier transmission system as claimed in Claim 32, wherein said multi-carrier transmission system is an orthogonal frequency division multiplex (OFDM) system.

36. (previously presented) A multi-carrier transmission system as claimed in Claim 32 further comprising means for transmitting frame synchronization data from the data scrambler to the data descrambler.

37. (previously presented) A method of scrambling user data prior to transmission in a multi-carrier transmission system in which synchronization frame data is periodically transmitted from a transmitter to a receiver to measure transmission channel characteristics, the method comprising:

combining user data with frame synchronization data to define scrambled data; and

transmitting the scrambled data to the receiver.

38. (previously presented) A method as claimed in Claim 37, wherein combining user data with frame

synchronization data comprises performing an exclusive OR (XOR) operation.

39. (previously presented) A method as claimed in Claim 37, wherein the frame synchronization data is pseudo-random.

40. (previously presented) A method as claimed in Claim 37, wherein combining user data with frame synchronization data comprises combining the two most significant bits of a synchronization frame.

41. (previously presented) A method of descrambling scrambled data in a multi-carrier transmission system in which synchronization frame data is periodically transmitted from a transmitter to a receiver to measure transmission channel characteristics, the scrambled data comprising user data having been combined with frame synchronization data, the method comprising:

receiving the scrambled data; and

combining the scrambled data with frame synchronization data.

42. (previously presented) A method as claimed in Claim 41, wherein combining scrambled data with frame synchronization data comprises performing an exclusive OR (XOR) operation.

43. (previously presented) A method as claimed in Claim 41, wherein the frame synchronization data is pseudo-

random.

44. (previously presented) A method as claimed in Claim 41, wherein combining scrambled data with frame synchronization data comprises combining the two most significant bits of a synchronization frame.

45. (previously presented) A method as claimed in Claim 41, wherein the multi-carrier transmission system is a discrete multi-tone (DMT) system.

46. (previously presented) A method as claimed in Claim 41, wherein said multi-carrier transmission system is an orthogonal frequency division multiplex (OFDM) system.

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EVIDENCE APPENDIX

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RELATED PROCEEDINGS APPENDIX

In re Patent Application of:
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CERTIFICATE OF FACSIMILE TRANSMISSION

I HEREBY CERTIFY that the foregoing correspondence has been forwarded via facsimile number 703-872-9306 to: Mail Stop Appeal Brief-Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 14TH day of October, 2004.